James M. Rosado

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Summary

Applied Research Mathematician and Software Developer with over a decade of experience spanning academic research, national security, and computational neuroscience. Holds active Top Secret/SCI clearance and a Ph.D. in Mathematics from Temple University. Proven expertise in mathematical modeling, algorithm design, high-performance computing, and AI/ML systems integration using Python, C/C++, MPI, and OpenMP. Demonstrated success delivering impactful software across government and academic sectors, including VR-based neuron simulations, graph-based query systems, and machine learning recommendation engines. Recognized with multiple awards for software engineering excellence at the NSA. Published author in leading journals and contributor to open-source neuroscience tools. Experienced educator and mentor with a commitment to innovation, cross-disciplinary collaboration, and scientific communication.

Education

Temple University, Ph.D. in Mathematics — Sep. 2017 – June 2022

Rowan University, M.A. in Mathematics — Sep. 2012 – June 2016

NJ Department of Education, Teacher of Mathematics Certificate — Sep. 2008 – Sep. 2009

Rutgers University, B.S. in Electrical and Computer Engineering — Sep. 2003 – June 2007

Pitman High School, High School Diploma — Sep. 1999 – June 2003

Experience

Applied Mathematician, U.S. Government / Department of Defense / NSA – Maryland, USA — Sep. 2022 – Present

- Conducts applied research and software development across various NSA branches with active TS/SCI clearance
- Developed graph-based query algorithms; collaborated with LLNL on integration with in-house software
- Built ML-based article recommendation systems using Python, Scikit-learn, TensorFlow, and PyTorch
- Received multiple agency awards for software engineering and machine learning work

Graduate Mathematics Intern, NSA Graduate Mathematics Program – Maryland, USA — Summer 2021

- Researched detection of synthesized speech using bispectrum analysis and topological data analysis
- Implemented and evaluated binary classifiers and neural networks for speech classification
- Co-authored internal paper and briefed findings to NSA leadership including the Director

Researcher, Center for Computational Mathematics & Modeling (C2M2), Temple University – Philadelphia, PA — Sep. 2019 – Sep. 2022

- Developed Neuro-VISOR, a real-time VR simulation platform for neuronal networks using C#, Unity, and PDE solvers
- Created Python mesh generation software using parallel transport and 1D neuronal geometries
- Enabled real-time interaction of synaptic and electrical behavior in virtual environments used in classrooms

Researcher, Queisser Research Group, Temple University – Philadelphia, PA — Sep. 2018 – Sep. 2022

- Developed HPC pipelines using MPI, FEM/FVM methods for calcium simulations under TMS
- Ran large-scale simulations on SDSC EXPANSE/COMET through NSF XSEDE awards (over 1.8M core-hours)
- Mentored students and collaborated across Temple, University of Minnesota, and University of Freiburg

Graduate Teaching Assistant, Temple University – Philadelphia, PA — Sep. 2017 – June 2022

- Instructed undergraduate mathematics courses, designed exams, and mentored students in research
- Volunteered for MCC tutoring and led SIAM workshops and student research talks

Adjunct Professor, Rowan University – Glassboro, NJ Sep. 2016 – June 2017

- Taught evening Calculus I courses and maintained active student engagement through Canvas
- Designed and graded assessments; provided regular student support and feedback

Adjunct Professor (Online), Rowan University – Glassboro, NJ Sep. 2024 – Dec. 2024

- Administered and online mathematics course
- Designed and graded assessments; provided regular student support and feedback via Canvas

Adjunct Professor, Towson University – Towson, MD Jan. 2025 – May 2025

- Taught an evening course in elementary mathematics
- Designed and graded assessments; provided regular student support and feedback via Blackboard

High School Mathematics Teacher, Clearview Regional School District – Mullica Hill, NJ Sep. 2009 – June 2017

- Taught 9th–12th grade math, co-taught special education classes, and led night/homebound instruction
- Developed interactive lessons aligned with NJ Core Content Standards and IEP accommodations

Mathematics Researcher, Rowan University – Glassboro, NJ Sep. 2012 – June 2016

- Developed and published finite frame partitioning algorithms using Mathematica and complex analysis
- Presented work at the Joint Mathematics Meetings (JMM) and STEM symposia

Private Tutor, Gloucester County, NJ Sep. 2011 – June 2016

- Delivered one-on-one instruction from grade school through high school mathematics
- Coordinated with parents and used manipulatives to reinforce student understanding

Publications

Neuronal Resilience and Calcium Signaling Pathways in the Context of Synapse Loss and Calcium Leaks Dec 2023

Rosado, J. M., Borole, P. R., Neal, M., Queisser, G.

SIAM Journal on Applied Mathematics, Vol. 83, Issue 6, pp. 2418–2442

Multi-scale Modeling Toolbox for Single Neuron and Subcellular Activity Under TMS Nov 2021

Rosado, J. M., Shirinpour, S., Hananeia, N., Tran, H., Galanis, C., Vlachos, A., Jedlicka, P., Queisser, G., Opitz, A.

Brain Stimulation, Vol. 14, Issue 6, pp. 1470–1482

Calcium Modeling of Spine Apparatus-containing Human Dendritic Spines Apr 2022

Rosado, J. M., Bui, V. D., Haas, C. A., Beck, J., Queisser, G., Vlachos, A.

PLOS Computational Biology, April 2022

Partitions of Equiangular Tight Frames Mar 2017

Rosado, J. M., Nguyen, H. D., Cao, L.

Linear Algebra and its Applications, Vol. 526, pp. 95–120

A Table of Definite Integrals from the Marriage of Power and Fourier Series Aug 2015

Rosado, J. M., Osler, T.

Scientia, Vol. 26, pp. 77–82

Ultrastructural Neuronal Modeling of Calcium Dynamics Under TMS (Doctoral Dissertation) May 2022

Rosado, James Michael

Temple University Libraries

Partitions of Finite Frames (Master's Thesis) June 2016

Rosado, James Michael

ProQuest Theses and Dissertations, Rowan University

Projects

Neuro-VISOR: Virtual Interactive Simulation of Reality 2018 – 2022
Developed at Temple University's C2M2 Lab for real-time VR simulation of neuronal dynamics.
github.com/c2m2/Neuro-VISOR

NeMo-TMS: Neuron Modeling for TMS 2018 – 2019
Multi-scale modeling toolbox to simulate transcranial magnetic stimulation effects on neurons.
github.com/OpitzLab/NeMo-TMS

CalcSim: Calcium Dynamics Simulator 2021 – 2023
MATLAB-based simulator for modeling intracellular calcium dynamics in single neurons.
github.com/NeuroBox3D/CalcSim

PythonNeuronMeshes 2022 – Present
Python software for generating surface meshes from 1D neuron morphology using parallel transport methods.
github.com/jarosado0911/PythonNeuronMeshes

Technologies

Languages: C++, C, Python, Java, C#, MATLAB, LUA, Shell scripting, LaTeX

Technologies: Unity3D, Git, GitHub, GitLab, Atlassian Bitbucket, MPI, OpenMP, Blackboard, Canvas, PowerSchool, PowerTeacher

Libraries & Frameworks: TensorFlow, PyTorch, Scikit-learn, word2vec, uG4 (unstructured grid framework)

Tools: Zoom, Skype, Geometer's Sketchpad, TI-84 Graphing Calculator

Operating Systems: Linux (RedHat, CentOS), macOS, Windows

Awards

DoD/NSA Awards:

2025 Monetary Award – For contributing to improved software performance - $2,000
2024 Monetary Award – For developing and implementing article recommendation systems - $3,000
2024 Performance Coin Award – For work completed on ML-based recommendation systems
2023 Time Off Award – For advanced coding practices in software engineering - 16 hrs.
2023 Monetary Award – For performance involving advanced query-based algorithms - $2,000

National Science Foundation HPC Awards:

2022 XSEDE Compute Research Award – $2,440
2021 XSEDE Compute Research Award – $2,440
2020 XSEDE Compute Research Award – $12,873

Temple University Awards:

Mar. 2022 Dissertation Completion Grant – $8,750
May 2020 First Summer Research Initiative Award – $6,000
May 2022 Jay Novik Graduate Student Fellowship – $5,000 for exceptional performance in the Graduate Mathematics Program
Summer 2019 NIH Brain Initiative Summer School Funding Award
Jan. 2019 Mathematics Department Excellence in Teaching Award – $500
Nov. 2018 SIAM Recognition – Leadership and coordination of SIAM Chapter activities

Rowan University Awards:

2015–2016 Certificate of Achievement in Mathematics – For JMM participation and publishing
2014–2015 Certificate of Achievement in Mathematics – For JMM participation

Rutgers University Awards:

2003–2007 Edward J. Bloustein Distinguished Scholar

Presentations

June 2022 — *"Ultrastructural Neuronal Modeling of Calcium Dynamics Under Transcranial Magnetic Stimulation"*, Doctoral Defense, Temple University, Philadelphia, PA
Oct. 2021 — *"Neuron Dendritic Spines: Modeling Calcium Communication"*, CST Research Mixer, Temple University, Philadelphia, PA
May 2021 — *"Hodgkin-Huxley Conductance Based Model: From 1D to 3D"*, Numerical PDEs Course, Temple University, Philadelphia, PA
Jan. 2021 — *"Applied Mathematics: Modeling Neuronal Electrical and Ion Dynamics"*, Temple University, Philadelphia, PA
Dec. 2020 — *"PDE Based Image Reconstruction"*, Numerical PDEs Course, Temple University, Philadelphia, PA
Nov. 2020 — *"Modeling an Action Potential and Neuronal Behavior"*, Graduate Seminar, Temple University, Philadelphia, PA
Jan. 2020 — *"An Investigation of Spine to Dendrite Calcium Communication"*, Applied Mathematics Seminar, Temple University, Philadelphia, PA
Oct. 2019 — *"Inner Workings of a Neuron: A Mathematical Perspective"*, Temple University Math Club, Philadelphia, PA
May 2019 — *"A Walk Through Calculus of Variations"*, Methods in Applied Mathematics Course, Temple University, Philadelphia, PA
Dec. 2018 — *"Sturm-Liouville Theory: An Example"*, Methods in Applied Mathematics Course, Temple University, Philadelphia, PA
March 2018 — *"A Table of Definite Integrals from the Marriage of Power and Fourier Series"*, EPaDel Spring Section Meeting, Philadelphia, PA (with T. Osler)
Fall 2017 — *"Partitions of Equiangular Tight Frames"*, Graduate Student Seminar, Temple University, Philadelphia, PA
Jan. 2017 — *"Partitions of Equiangular Tight Frames"*, Joint Mathematics Meeting, Atlanta, GA (with H. Nguyen and L. Cao)
May 2016 — *"Partitions of Equiangular Tight Frames"*, STEM Symposium, Rowan University, Glassboro, NJ (with H. Nguyen and L. Cao)
April 2016 — *"Frame Partitioning Algorithms"*, Master's Thesis Presentation, Rowan University, Glassboro, NJ
May 2015 — *"A Table of Definite Integrals from the Marriage of Power and Fourier Series"*, STEM Symposium, Rowan University, Glassboro, NJ (with T. Osler)
Aug. 2015 — *"A Table of Definite Integrals from the Marriage of Power and Fourier Series"*, MAA Mathfest, Washington, D.C. (with T. Osler)
May 2015 — *"A Table of Definite Integrals from the Marriage of Power and Fourier Series"*, Sigma Xi Research Symposium, St. Joseph's University, Philadelphia, PA (with T. Osler)
Jan. 2015 — *"A Table of Definite Integrals from the Marriage of Power and Fourier Series"*, Joint Mathematics Meeting, San Antonio, TX (with T. Osler)

Undergraduate Research

Undergraduate Engineering Research, College of Engineering, Rowan University – Glassboro, NJ — Summer 2005

- Designed transistor-based replica of leech heart interneuron
- Modeled system using Hodgkin-Huxley formalisms for circuit-based neuron simulation
- Investigated FPGA experimentation using Mentor Graphics Advantage software

Undergraduate Research, College of Humanities and Social Sciences, Rowan University – Glassboro, NJ — June 2000 – June 2003

- Conducted archaeological conservation at the Museum of La Serena, Chile
- Designed a statistical program to estimate human stature from archaeological remains
- Participated in archaeological site mapping and international research collaboration

Undergraduate Research (Abroad), Universidad Catolica del Norte – Coquimbo, Chile June 2004

- Translated and analyzed ChemCAD software for shellfish cultivation system design
- Studied the aquacultural processes for farming and harvesting shellfish

Professional Affiliations

Sep. 2018 – June 2022 — Temple University SIAM Chapter President
Sep. 2018 – June 2022 — Temple University SIAM Chapter Member
Sep. 2018 – June 2022 — Society for Industrial and Applied Mathematics (SIAM) Member and Journal Subscriber
Sep. 2017 – June 2022 — American Mathematical Society (AMS) Member
Sep. 2017 – June 2022 — Mathematical Association of America (MAA) Member
Sep. 2015 – June 2017 — Rowan University Pi Mu Epsilon Chapter Member
Sep. 2015 – June 2017 — Pi Mu Epsilon National Mathematics Honor Society Member
Sep. 2008 – June 2017 — New Jersey Education Association (NJEA) Member
Sep. 2008 – June 2017 — Clearview Regional Education Association Union Member
Sep. 2006 – Sep. 2008 — Institute of Electrical and Electronics Engineers (IEEE) Member and Journal Subscriber

Hobbies

Reading: Neuroscience, mathematics, science fiction, history, poetry, biographies, philosophy, high fantasy

Creative pursuits: Writing mathematical articles and poetry, drawing, painting

Fitness: Running, weight lifting, hiking

Sports and entertainment: Attending MLB and NFL games (Orioles, Phillies, Ravens, Eagles), video games, board games

Leisure and travel: Exploring restaurants, breweries, wineries; traveling within the U.S. and abroad